Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal Form

Section 1. General administrative information

Mitigation for Excessive Drawdowns at Hungry Horse and Libby Reservoirs- Libby Dam Component

Bonneville project number, if an ongoing project 9401001

Business name of agency, institution or organization requesting funding
Montana Fish, Wildlife and Parks and the Confederated Salish and Kootenai Tribes

Business acronym (if appropriate) MFWP and CSKT

Proposal contact person or principal investigator:

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Subcontractors. List one subcontractor per row; to add more rows, press Alt-Insert from within this table

Organization	Mailing Address	City, ST Zip	Contact Name
We will be subcontracting stream reconstruction design, genetic analysis, fencing etc. Contracts >$5,000 will be bid through State of Montana bid process			
WestWater Consultants Inc.	1112 Catherine Lane	Corvallis MT 59828	Gary Decker

Land and Water Consulting Inc.	P.O. Box 8254	Missoula, MT 59807	Paul Callahan
Wildland Hydrology Consultants	157649 U.S. Hwy 160	Pagosa Springs, CO 81147	Dave Rosgen

NPPC Program Measure Number(s) which this project addresses.
903(a), 903(b) (NPPC 1987), 10.1B, 10.1C, 10.2A.2, 10.2B, 10.3A.1-4, 10.3A.6, 10.3A9, 10.3A11, 10.3A.18 (NPPC 1995)

NMFS Biological Opinion Number(s) which this project addresses.

Bull Trout Proposed ESA Listing (62 FR 32268)

Bull trout and westslope cutthroat trout recovery plans and actions (Montana Bull Trout Restoration Team 1997; Montana Bull Trout Scientific Group 1995; MFWP and CSKT 1991, 1993; Montana Westslope Cutthroat Trout Recovery Team, in prep.)

NMFS hydrosystem operations for salmon recovery (56 FR 58619; 57 Fr 14653)

Other planning document references.

If the project type is "Watershed" (see Section 2), reference any demonstrable support from affected agencies, tribes, local watershed groups, and public and/or private landowners, and cite available documentation.

PLANNING DOCUMENTS: Fisheries Losses Attributable to Reservior Drawdown In Excess of Limits Stated in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1987-1991 (Marotz and DosSantos 1993), Fisheries Losses Attributable to Reservior Drawdown In Excess of Limits in the Columbia Basin Fish and Wildlife Program: Hungry Horse and Libby Dams 1991-1993 (MFWP and CSKT 1997), Fisheries Mitigation Plan for Losses Attributable to the Construction and Operation of Libby Dam (MFWP, CSKT and KTOI 1998; currently in public scoping process prior to submission to NPPC), Montana Bull Trout Restoration Plan (Montana Bull Trout Restoation Team 1997), Montana Westslope Cutthroat Restoration Plan (Montana Westslope Cutthroat Restoration Team, In Prep), Forest Plan: Kootenai National Forest (cite), Montana Stream Protection Act (1963), Natural Streambed and Land Preservation Act (1975).

Subbasin. Kootenai River subbasin in Montana, Idaho and British Columbia. Work will primarily be conducted in the upper and middle Kootenai River segments. This includes all the major subdrainages connected to Libby Reservoir and the Kootenai River above Lake Koocanusa and downstream of Libby Dam to the Idaho border. Project and

monitoring work is currently underway or is planned for years beyond FY99 on Therriault, Sinclair, Grave, Fortine, Swamp, and Lake Creeks of the Tobacco River Drainage, a tributary to Libby Reservoir. Work will occur on Barron, Young, Pinkham, Canyon, Five Mile, Cripple Horse. Additional work will be occuring on Libby Creek, the Fisher River and its tributaries, Flower, Parmenter, Bobtail, and Pipe and O'Brien Creeks, tributaries of the mainstem Kootenai. Monitoring work will be occurring on the mainstem Kootenai River above Libby Reservoir with special emphasis on the Wigwam drainage of the Elk River system in British Columbia.

Short description.

Mitigate for fish and fish habitat losses due to excessive drafting of Libby Reservoir for power production (Fish and Wildlife Program measures 903(a) and (b)).

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
	Anadromous fish		Construction	X	Watershed
X	Resident fish		O & M	*	Biodiversity/genetics
*	Wildlife		Production	*	Population dynamics
	Oceans/estuaries	0	Research	*	Ecosystems
	Climate	*	Monitoring/eval.	*	Flow/survival
	Other	X	Resource mgmt		Fish disease
		*	Planning/admin.		Supplementation
			Enforcement	*	Wildlife habitat en-
		*	Acquisitions		hancement/restoration

Other keywords.

Resident fish, westslope cutthroat trout, bull trout, burbot (*Lota lota*), native species recovery, metapopulation dynamics, stream restoration, remote site incubators, natal stream imprinting, stock identification, life history, migration patterns, adaptive management, watershed planning implementation

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9608720	Focus Watershed Coordination-Kootenai River Watershed (FWC-KR)	Excessive Drawdown Mitigation (EDDM, Project # 9401000), is the mechanism by which local watershed plans developed by the FWC-KR are funded and implemented. EDDM also provides

		GIS support for developing and prioritizing watershed plans
9404900	Kootenai River Ecosystem Improvements Study (KTOI)(IDFG)	Sister project help assess techniques for watershed improvement
8345700	Kootenai IFIM/Libby Dam Mitigation (LDM)	Excessive Drawdown Mitigation assists LDM in planning mitigation activities and provides personnel when larger crews are necessary. EDDM provides GIS and microimaging otolith, vertibrae and scale reading support to LDM.
3874700	Streamnet Geographic Information Services Unit	EDDM is the GIS station for the Kootenai River System providing data layer updating and development for managers and mitigation efforts and provides mapping services for local watershed planning and research.
9648701	Montana Focus Watershed-Flathead System (FWC-FR)	Share techniques for implementing locally developed watershed plans
New proposal	Purchase Conservation Easement from Plum Creek Timber Company in Thompson and Fisher Rivers (MFWP)	Collect and summarize the geomorphic and fisheries data required for determination of the bandwidth necessary to protect fisheries resources in intact stream/riparian corridors in the Fisher River Drainage. Also, delineate the location and bandwidth necessary to cost-effectively recover impacted streams where their are substantial potential fisheries and riparian resources.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	**Assess the metapopulation strength of transboundry (British Columbia and Montana) populations of native bull trout in the**	A	In cooperation with BC Environment, conduct aerial (helicopter) redd surveys of the major tributaries of the Kootenai River (Lussier, Skookumchuk, St.

	Kootenai River, above Libby Dam.		Mary, Findlay, Kikomun, Bull, Wild Horse and White Rivers, Gold and Bloom Creeks) of British Columbia.
		B	Ground truth major redd concentrations found by aerial surveys and identify possible index streams for long term population monitoring.
		C	In cooperation with MFWP management personnel and Libby Mitigation, conduct redd surveys in the Grave and Weasel Creek drainages of Montana.
		D	Capture and implant 30 adult bull trout in Libby Reservoir and the Kootenai River upstream of the Elk river, with 50-month radio transmitters.
		E	Track movements of radio-tagged trout through the staging and spawning seasons to identify likely spawning areas.
2	Establish permanent stream form and sediment monitoring stations in the Wigwam River (BC) and Grave Creek (MT) to allow early detection of habitat degradation that could contribute to population declines for bull trout and westslope cutthroat trout in these two known spawning tributaries.	A	Identify known spawning areas using redd counts in the Wigwam River and Grave Creek drainages and other identified drainages.
		B	Conduct McNeil core sampling in both drainages using stratified random sampling techniques within these known spawning areas and establish permanent coring stations for long term monitoring.
		C	Conduct juvenile population estimates at selected locations within the drainages.

		D	Identify known rearing areas in both drainages from population estimates and conduct Crouse substrate scoring transects in these areas.
		E	Correlate juvenile rearing densities with substrate scores and establish permanent substrate scoring stations in both drainages and juvenile population estimates.
		F	In cooperation with the Murphy Lake Ranger District, conduct stream habitat surveys for the entire Grave Creek drainage to identify the total amount and quality of spawning and rearing habitat available in the drainage.
3	Fill in the gaps in our knowledge of native westslope cutthroat populations and other trout species in Libby Reservoir and associated tributaries.	A	Determine strength of adfluvial spawning runs in Young, Big, Five-mile, Ten-Mile, Pinkham, Sinclair**,** Therriault, Swamp, Lake and Fortine Creeks and the Tobacco River, using migrant traps and redd counts.
	Determine the effectiveness of using remote site incubators (RSI's) and artificial redd construction as a means of increasing recruitment of age-2 or greater westslope cutthroat trout into Libby Reservoir.	B	Operate the Young Creek permanent weir to capture upstream migrating adult trout and downstream migrating juvenile trout to monitor number of spawning adults entering the creek to spawn and measure the number and size of WCT emigrating from the creek into the reservoir.
		C	Conduct electrofishing population estimates in historically sampled reaches to monitor the effects of RSI's and artificial redds. Begin comparative monitoring for future reference.
		D	Continue deployment of RSI's

			(approximately 90,000 eyed-eggs/ yr) in Young Creek in each of the next four years.
5	Evaluate thermal otolith marking methods for marking WCT fry delivered from RSI's to enable more effective evaluation of RSI program.	A	Treat all batches of eggs being deployed in RSI's with a unique series of temperature variations
		B	Collect 15-20 eyed-eggs from every lot of eggs being deployed in RSI's, label and preserve in ethanol.
		C	Collect 15-50 emerged fry from each RSI, label and preserve in ethanol.
		D	Mount a random sample of eye-eggs from each lot, prepare a cross section of otolith from each fish in a lot and create a digital images catalogue of otolith growth patterns.
		E	Mount a random sample of emerged fry from each RSI collection, prepare otolith cross sections and create a digital images cross section catalogue of otolith growth patterns.
		F	Collect otoliths from out-migrating adult WCT captured in traps in Young Creek and from those WCT captured in Libby Reservoir gill nets. Prepare cross sections of otoliths.
		G	Determine if otolith patterns found in adult WCT have a similar early life pattern to that of a catalogued lots of eyed-eggs or emerged fry.
6	Develop a source of "in-drainage" westslope cutthroat trout eggs for use in RSI and artificial redd, WCT recovery program.	A	Identify potential sources of "in-drainage" WCT eggs in British Columbia hatchery system.
		B	If a source "in-drainage" derived WCT eggs is available in BC,

			identify brood source characteristic, targeting fish that are "wild," have shown a tendency to thrive in large water bodies and have good potential to establish self-reproducing spawning runs.
		C	If a suitable "wild" strain is identified from BC, negotiate an egg exchange, obtain permits etc. to allow use of the eggs in the recovery program.
		D	If no source of eggs is available, cooperate with BC Environment to develop a plan to trap and hold sufficient numbers of Wigwam River to provide genetic integrity and take sex products to transfer into existing Montana hatchery system for brood stock.
7	As part of the focus watershed program, develop an integrated watershed management plan for Young and Dodge Creeks which will incorporate cooperative agreements between MFWP fisheries and wildlife divisions, USFS and Montana Department of Natural Resources and Conservation (DNRC) and private landowners adjacent to the creeks.	A	Develop a memorandum of understanding between the USFS, Rexford district and MFWP for a two-year cooperative landscape analysis for the federal portion of the drainages.
		B	If favorable progress can be made in obtaining commitments from the USFS to reduce sediment loading in Young Creek, emanating from USFS lands, design and implement a channel reconstruction project for the channelized portion of Young Creek on DNRC lands.
		C	Remove and replace failing bridges and culverts on the private land sections of Young and Spring

			Creeks from the DNRC section to the confluence with Libby Reservoir.
		D	Complete revegetation program in areas of the creek where riparian fencing has been implemented.
8	As part of the focus watershed program, develop watershed-based, site-specific stream habitat protection and enhancement project identification and implementation on Libby Reservoir tributaries.	A	Contact landowners to describe goals and encourage cooperation in renovation efforts.
		B	Conduct stream inventories and evaluate feasibility of returning specific stream reaches to quality native trout habitat.
		C	Select and prioritize project sites for habitat restoration, livestock fencing and watering stations, migrant passage improvement, point source sediment abatement, streambank stabilization and revegetation of riparian areas.
		D	Formalize landowner and agency agreements to protect investments. Develop cost-share programs with United States Forest Service, U.S. Natural Resources Conservation Service, Montana Department of Natural Resources and Conservation, Lincoln County Conservation District and other agencies**.**
		E	Develop site plans, maps, material lists and contracts, obtain 124, 3A, 404 and chemical treatment permits for selected project sites.
		F	Initiate purchasing, contracts and implement plans at highest priority

			sites. Document remaining projects for inclusion in the Libby Mitigation Program.
9	In cooperation with the Lincoln County Conservation District, Montana Department of Transportation (MDOT)and NRCS, develop a native material stream bank stabilization stockpile (rootwads, boulders, revegetation material) for use by private landowners, MDOT and MFWP in streambank conservation projects, in the Tobacco River drainage, where standard rip-rap and/or stream channelization are not desired.	A	Seek potential sources of useful dimensioned rootwads, logs and rocks and negotiate a reasonable price for such material.
		B	Contract with local equipment operators to collect, transport, and store at the State of Montana Department of Transportation storage yard in Eureka, rootwads, boulders and other native materials that can be used in stream restoration and bank stabilization projects.
		C	In cooperation with the NRCS and Lincoln Conservation District, provide technical advice and materials from the stockpile to landowners seeking to improve bank stability and fish habitat on streams where they hold interest.
10	Develop a brood stock of native interior redband trout to be used as the initial source of eggs to an established hatchery facility.	A	Survey for and design a creek channel for the spring water source at the Libby Field Station compound using Rosgen morphological standards that can

			be secured from escapement of trout.
		B	Obtain 124, 3A and 404 permits for channel construction and contract for channel excavation.
		C	Line the excavated creek bed and place rearing and spawning habitat structures in the channel.
		D	Monitor new creek for water quality and make adjustments as needed to provide maximum rearing habitat. Monitor for benthic invertebrate population establishment.
		E	Conduct population estimates for interior redband trout in the Basin Creek and the East Fork Yaak River drainages and determine how many individual fish might be taken from this population without impacting its viability.
		F	Given favorable indications from Task 10D and 10E, electrofish interior redband from Basin Creek and transport to the Libby Field Station.
11	Assess the seasonal movement and habitat use of native burbot and westslope cutthroat trout and introduced “kamloops” trout in the Kootenai River above Libby Dam.	A	In cooperation with BC Environment, capture burbot and cutthroat trout using hoop nets, merwin traps, migratory traps, angling and electrofishing equipment, in Lake Koocanusa and its tributaries.
		B	Surgically implant radio and sonic transmitters into captured burbot and cutthroat trout.
		C	Monitor movements of radio-tagged fish through several seasons to identify seasonal movements, habitat use and likely spawning concentrations.
		D	Determine habitat preference by use of benthic samplers, temperature probes, turbidity

			samplers, and SCUBA transects and snorkeling.
12	Establish permanent protection of stream corridors where habitat protection and enhancement investments have been made by acquiring easements and purchase of riparian zones in target recovery areas.	A	In cooperation with the Kootenai Drainage Focus Watershed Coordination Program, identify and develop potential easements and land purchase opportunities for riparian zones in Young Creek drainage, the Tobacco River and its tributaries.
		B	Collect and summarize the geomorphic and fisheries data required for the *Purchase Conservation Easement from Plum Creek Timber Company in Thompson and Fisher Rivers program* to determine the bandwidth necessary to protect fisheries resources in intact stream/riparian corridors in the Fisher River Drainage. Also, delineate the location and bandwidth necessary to cost-effectively recover impacted streams where their are substantial potential fisheries and riparian resources.
		C	Cooperatively develop, with the Kootenai Drainage Focus Watershed Coordination Program, budget requests to BPA for acquisition of easements and fee title for stream corridor protection areas.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	8/98	9/2001	(5)
2	3/98	6/2001	(1)
3	3/98	7/2001	(3)
4	7/98	9/2001	(3)
5	4/98	9/2001	(4)

6	6/98	9/2001	(3)
7	6/98	11/99	(7)
8	10/97	9/2001	(57)
9	6/97	9/2001	(2.5)
10	6/98	10/2005	(2.5)
11	11/96	9/2001	(5)
12	10/98	9/2001	(10)

Schedule constraints.

Project schedule changes are the norm rather than the exception due to many variables beyond our control making prioritization of tasks an adaptive process. Some objectives proceed more quickly than anticipated and others more slowly. It is anticipated this project will proceed on schedule.

Completion date.
2002. Some projects initiated by excessive drawdown mitigation will continue under the Libby Mitigation Program (project 8346700)

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	0.2 FTE Focus Watershed Coordinator, 1 FTE Senior Technician, 1FTE Junior Technician., 0.5 FTE Junior Technician	$62,275
Fringe benefits		$12,455
Supplies, materials, non-expendable property	Minor tools and instruments, submeter GPS equipment ($20,000), software habitat restoration materials, lab supplies	$52,136
Operations & maintenance	Office supplies, copies, cost-share replace furnace ($1,200)	$3,750
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Conservation easements, fee title, long term management agreements to protect stream corridors, cost-share office/ lab improvements ($2,850)	$142,850
PIT tags	# of tags: 850	$2,465
Travel	52 nights per diem field camp @$12, 170 days @$23, 10 nights out-of state lodging@50, 12 nights in-state lodging @ $36.50. 39,500 miles @ $0.29/mile	$16,927

Indirect costs	17.2% overhead	$52,012
Subcontracts	Stream rehab. design and construction, excavator, fence construction, genetic analysis, training, bridge construction, fixed wing and helicopter rental etc.	$129,535
Other		
TOTAL		$374,405

Outyear costs

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	$380,000	$300,000	250,000	
O&M as % of total	21%	26%	21%	

Section 6. Abstract

Extreme reservoir drawdown impacts all biological trophic levels as the pool volume shrinks, and reduces the probability that the reservoir will refill during spring runoff. Refill failures are especially harmful to the fishery resource during the productive warm months. Resulting discharges influence biological productivity in the Kootenai River downstream. Dam operation and other anthropogenic factors have resulted in population declines in native fish species. Kootenai River white sturgeon are listed as endangered species and bull trout are proposed for listing under the Endangered Species Act. Westslope cutthroat trout are likely to be petitioned for listing, and burbot in the middle and lower Kootenai are likely candidates for petition before the turn of the century. This project executes research and mitigative actions designed to improve the survival and growth of these native fish species and protect, as genetic reserves, stable to increasing bull trout and burbot populations in the upper Kootenai. Habitat improvements in tributary streams focus on natural reproduction, rearing and integrated, multi-agency watershed planning. Results complement and extend the Libby Mitigation Program (project 8346700) and Kootenai Focus Watershed Program (project 9608720). Cooperative projects are designed to improve the likelyhood of long-term persistence, survival and growth of native trout populations by protecting, recovering and modifying environmental conditions in the Kootenai Watershed.

Section 7. Project description

a. Technical and/or scientific background.

Drawdown and discharge limits were placed on Hungry Horse and Libby dams by measures 903(a) and (b) of the Northwest Power Planning Council's Fish and Wildlife Program (NPPC 1987). The NPPC Program directs Bonneville Power Administration to

fund the mitigation of fisheries losses caused by reservoir drawdowns for power operations in excess of limits set at Libby Dam(90-110 feet). These drawdown limits remain in effect until an updated operating plan called Integrated Rule Curves (NPPC 1994) are implemented.

Reservoir drawdowns have frequently exceeded the designated limits during the last decade. In November 1993, Montana Fish, Wildlife & Parks (FWP) and the Confederated Salish and Kootenai Tribes (CSKT) initiated a three year program to mitigate fisheries losses caused by excessive drawdowns during the period 1987 through 1991 (Marotz and DosSantos 1993). Fisheries impacts again occurred when the draft limits were exceeded in 1993 at Libby Reservoir. Fisheries losses incurred due to these power operations could not be evaluated at the time of the original mitigation proposal. Losses were later estimated by comparing paired simulations using the quantitative biological models HRMOD and LRMOD (Marotz et al. 1996) duplicating techniques described by Marotz and DosSantos (1993).

Growth of the target species in the model, kokanee, was reduced by 1.1 to 1.6 percent in length and 3.3 to 4.6 percent in weight as the drawdown limit was exceeded. Angling pressure varies with fish abundance and size (Chisholm and Hamlin 1987; FWP unpublished files).

Estimation of the economic value attributable to the biological effects listed above is difficult. We can only guess at the value of dwindling fish populations (eg. bull trout, westslope cutthroat, burbot etc.) to future generations, so must focus on the potential fisheries benefits in terms of angler days. Estimated annual fisheries losses during the period 1989 through 1991 ranged from $748,374 to $1,759,969 (Marotz and DosSantos 1993). In 1993, reservoir drawdown and estimated biological effects were similar to 1989, or an approximate loss of $1.7 million. Mitigation measures are listed in the attached objectives and tasks. Mitigation measures are designed to partially offset fisheries losses..

Libby Reservoir.

In 1993, Libby Reservoir was drafted to 136 feet below full pool, exceeding the 90 to 110 foot drawdown limit. Inflow volume was low enough to maintain discharges within flood stage limitations without drafting below the 90 foot draft limit. When the limit was exceeded, aquatic resources were confined within a reduced reservoir volume as the surface area diminished. This resulted in an overall loss in aquatic production and increased the potential for high predation rates on juvenile kokanee, trout and whitefish as fish were concentrated in a smaller pool.

Primary production, the base of the aquatic food web, declined by 4.8 percent during 1993 when drawdown exceeded 90 feet. Also, deep drawdowns reduce the probability that the reservoir will refill during the following summer. Since primary production is maximized when the reservoir remains near full pool during the warm months (June through September), impacts due to excessive drafts are exacerbated when the reservoir fails to refill.

Reservoir drawdown reduces the surface area and volume of the pool, thus reducing zooplankton production. This important food for kokanee, young trout and adult trout during the winter, was reduced 4.7 percent due to excessive drawdown in 1993. Reduced reservoir volume and thus, more rapid water replacement in the pool, results in greater downstream loss of zooplankton.

Benthic insect production, an important springtime food supply for insect eating fish species, was reduced by 25.8 percent when drawdown exceeded 90 feet in 1993. Insect larvae dry or freeze when water recedes during reservoir drawdown. One excessive draft can impact benthic insect production for over two years.

Terrestrial insect deposition is reduced as the reservoir surface area shrinks and water recedes from shoreline vegetation. In 1993, excessive drawdown reduced the accumulation of this important summer / fall food supply by 11.8 percent (Coleoptera), 2.0 percent (Hemiptera), and 0.6 percent (Homoptera). There as little effect on Hymenoptera, presumably because of their better flying ability (wider dispersal from shoreline vegetation) and later seasonal activity period.

Trophic responses reveal that aquatic and terrestrial insects are effected to a greater extent than plankton. Stomach contents have shown that trout and whitefish eat mainly insects during spring, summer and fall, so are more severely impacted by reduced food availability than are planktivorous species (eg. kokanee, Columbia River chub etc.). Long-term monitoring has shown that rainbow and cutthroat trout populations have stabilized at low levels in the reservoir. Mountain whitefish are seldom captured anymore in seasonal population monitoring (Dalbey et al. 1997, in final draft). Spawning runs of trout in reservoir tributaries have shown a continuous decline since impoundment (Snelson et al. 1997, in final draft; Marotz et al. 1988; Marotz and Fraley 1986). The above impacts have been linked to decreased survival, reproductive success, fecundity and shifts in species relative abundance. Columbia River chubs are now the most abundant species in Libby Reservoir.

The Kootenai Drainage, as a whole, in Montana, has experienced a severe decline in the range and number of four of five native trout species (bull trout, westslope cutthroat trout, mountain whitefish and inland redband trout). The status of the fifth native trout,

the pygmy whitefish, in the system, is not well studied. Mountain whitefish populations in Koocanusa have declined to low levels when compared with those of the mid 1970's.

With the construction of Libby Dam in 1972, the Kootenai River in Montana was effectively isolated into three population segments (only downstream gene flow is likely): the upper Kootenai, upstream of Libby Dam; the middle Kootenai, between Libby Dam and Kootenai Falls; and the Lower Kootenai below Kootenai Falls to Kootenai Lake in British Columbia (Montana Bull Trout Scientific Group 1996). In the drainage, three of the five native trout species are likely candidates for listing by the US Fish and Wildlife Service as federally protected endangered species over the next few years (petitions for listing have already been submitted for bull trout which was determined to warrant listing, inland redband trout which have been petitioned for listing and ruled not warranted for lack of population and genetic data, and petition for listing for westslope cutthroat trout listing is expected shortly).

White Sturgeon, also native to the drainage, are currently listed under ESA provisions. Native burbot (also known as ling, *Lota lota)* once provided a popular fishery throughout the Kootenai system. The burbot fishery appears to have begun to decline in the early 1960's (Hensler 1996). But population declines have continued to occur since the construction of Libby Dam in 1972 (Paragamian 1993). The once robust population appears to persist at very low levels in both the middle and lower Kootenai.

In the upper Kootenai declines in numbers and in the range of whitefish and westslope cutthroat trout have been severe when compared to the late 1970's and 1980's (MFWP, CSKT and KTOI 1997; Snelson et al. 1997, Marotz et al.1988, Huston et al. 1984). ESA listing for either species may be warranted in this segment.

Bull trout populations in the upper Kootenai (including the Kootenai River in British Columbia) appear to be stable (Westover 1997, Dalbey et al. 1997). The transboundry population shared with Canada is numerically the strongest metapopulation in Montana. Recent spawning redd surveys and radio telemetry studies performed jointly by BC Environment and Montana Fish, Wildlife and Parks (BPA projects 9401000, 8346700) and a migration trap operated by BC Environment on the Wigwam River, indicate that this transboundry population may be the strongest bull trout metapopulation in the world. A major concentration of spawning in the upper Kootenai occurs in a previously roadless, 27 km of the Wigwam River in British Columbia (the headwaters of the Wigwam River reach into Montana). A long-term timber harvest program began in the Wigwam drainage in 1997. Primary haul roads were constructed into the drainage in the summer of 1997 and timber harvest and additional road construction is expected to continue this winter.

Cursory helicopter redd surveys conducted by jointly by MFWP (BPA project 9401000) and BCMOE, in October 1997, of other drainages in the Upper Kootenai system, did not

reveal any other major spawning concentrations in the areas where they were most expected.

While the Upper Kootenai population is considered to be quite strong, concentration of a large segment of the reproductive capability of the drainage is directed to a relatively tiny portion of the system. This potentially places the population at great risk. The risk is heightened considering the construction of new roads and increased timber harvest in the Wigwam drainage.

While historic population trend data for bull trout in the other two segments of the Kootenai drainage are largely unavailable, both segment's populations are in danger from hybridization, subdivision, dam operation and illegal harvest (Montana Bull Trout Scientific Group 1996). Aggressive conservation of the upper Kootenai metapopulation may provide a critical genetic reserve for restoration of stocks in the middle and lower Kootenai segments.

Key subbasins within the Kootenai drainage, which are critical to native species restoration, are experiencing a rapidly progressing change in land ownership and management patterns. Subdivision and subsequent residential development of much of the agricultural and timber lands adjacent to waterways in the drainage likely poses one of the greatest threats to weak but recoverable stocks of trout species mentioned above. Plum Creek Timber Company, a major landholder in the Kootenai system is currently divesting itself of large tracks of its lakeshore and streamside holdings basin-wide. Growth of small tract development throughout the Tobacco River valley and its tributaries is occurring at a record rate. This is also true for the majority tributaries to the middle Kootenai, placing many important westslope cutthroat and bull trout spawning tributaries and recovery areas in peril.

Immediate to short-term action is going to be required to protect stream and riparian corridors through many of these areas if cost-effective recovery efforts are to be implemented. Delaying the commitment of resources to establish permanently protected stream corridors through easement, long-term management agreements and purchase of fee title in these stream corridor areas, is certain to drastically balloon the cost and possibility of long-term persistence of native species in much of their range.

Pilot projects initiated through this contract will expand the effectiveness of the Focus Watershed Program in the Kootenai system, and help guide the Libby Mitigation program scheduled for submission to NPPC this spring.

b. Proposal objectives.

OBJECTIVE 1. **Assess the metapopulation strength of transboundry (British Columbia and Montana) populations of native bull trout in the Kootenai River, above Libby Dam.**

The Kootenai River and Lake Koocanusa contain important populations of native bull trout which pass freely over the international boundary between British Columbia (BC) and Montana (MT). Recent MFWP telemetry studies on bull trout show that individual fish range widely throughout the reservoir in MT and the river in BC, during different seasons of the year. Last year a cooperative program between BC Environment and MFWP identified the Wigwam River (BC) as one of the most important spawning tributaries for bull trout in the Kootenai Drainage (concentrated in a 17 mile area). Bull trout are a species of special concern in Montana. It is known that bull trout spawn in other tributaries of the Kootenai Drainage (above Libby Dam) but the strength of runs in these tributaries in BC has not been determined, except in the Grave Creek drainage of MT. New logging operations are planned in the roadless Wigwam drainage over the next decade. Because the potential exists for a local catastrophic events to cause declines in the spawning run in the Wigwam River, it is important to know if there are any additional strong spawning runs in the drainage that would provide adequate recolonization potential for recovery of populations if such events should occur. This baseline information is essential for mid and long range watershed planning for this species. Identifying migration patterns will also give managers essential information for manipulating harvest regulation to best protect the bull trout populations.

OUTCOME OF OBJECTIVE 1:

A GIS database and maps will be developed and made available via the internet which will indicate where potential concentrations of spawning occur. A database of helicopter and ground redd counts will be attached for index streams. Telemetry locations will also be added as a data layer. A report of findings regarding bull trout migrations and spawning trends will be updated yearly and be available at the MFWP-Libby internet site (MFWP-Libby internet homepage will be developed spring of 1998). Quarterly project progress reports, which will be delivered to BPA, will also include this information.

OBJECTIVE 2. **Establish permanent stream form and sediment monitoring stations in the Wigwam River (BC) and Grave Creek (MT) to allow early detection of habitat degradation that could contribute to population declines for bull trout and westslope cutthroat trout in these two known spawning tributaries.**

OUTCOME OF OBJECTIVE 2:

A GIS layer of this information will be developed and available on the website and reported in quarterly reports to BPA. Correlations will be determined between adult and

juvenile densities and core ratings and substrate scores and yearly stream condition reports will be forwarded to both Canadian and US fish managers.

OBJECTIVE 3. Fill in the gaps in our knowledge of native westslope cutthroat populations and other trout species in Libby Reservoir and associated tributaries.

Evaluations of trout populations (1970-present) have shown an alarming decreasing trend in adfluvial spawners. Habitat degradation has occurred in some locations. Because heavy run-off conditions over the past two seasons, it has been difficult to achieve precise measures of adfluvial spawning migrations. As efforts are made to improve reservoir and tributary populations of westslope cutthroat trout, it will be important to document current adfluvial use of the major tributaries by spawning fish to evaluate progress.

OUTCOMES OF OBJECTIVE 3:
A GIS layer of this information will be developed and available on the website and reported in quarterly and annual reports to BPA. This information will provide a basis for evaluating the success of mitigation actions directed at recovering the reservoir's native species fishery.

OBJECTIVE 4. Determine the effectiveness of using remote site incubators (RSI's) and artificial redd construction as a means of increasing recruitment of age-1 or greater westslope cutthroat trout into Libby Reservoir.

Upstream migrant trapping at Bristow and Young Creeks, tributaries to Libby Reservoir, indicate a severe decline in numbers of adfluvial westslope cutthroat trout adults ascending reservoir tributaries during the spring spawning period. Electrofishing population estimates for juvenile size classes in the tributaries also show a significant decline. This decline is occurring in Young Creek despite long-term planting of fingerling westslope cutthroat trout (WCT) into the tributary. Because quality spawning habitat in many major tributaries to the reservoir, including Young Creek, has become limited, site-specific gravel quality improvements (artificial redd construction) were attempted and remote site incubators were deployed in 1996 and 1997 in an effort to test the effectiveness of using these techniques to better imprint westslope cutthroat trout to the creek. It is hoped that these techniques will promote longer creek residence times than has been observed in fingerling plants. Both techniques were used in historic spawning reaches of Young Creek, using eyed-eggs provided from Washoe Park Hatchery. These eggs are progeny derived from wild, Hungry Horse Reservoir westslope cutthroat trout. An estimated 45,000 westslope cutthroat fry were incubated and emerged directly into the creek from the two techniques, in 1996 and approximately 50,000 fry were released with the RSI technique in 1997. If monitoring efforts show significant

increases in 1+ and 2+ WCT (a significant increase was observed in electrofishing population estimates in 1997) in the target streams where the RSI are deployed, we will know that this technique can play an important role in reestablishing wild, resident fisheries in tributary streams where adfluvial runs have been severely depress or are now extinct. If spring migrant trapping for returning adults show a significant increase in numbers beginning in 1999-2001 or a significant increase in yearly gill net catches of WCT is observed, we will have strong evidence that these techniques can provide an important tool for native trout recovery throughout the Northwest.

OUTCOMES OF OBJECTIVE 5:
A report of findings will be made to BPA in quarterly and annual reports and pier review publications when applicable. If initial results show that expanded RSI deployment is justified, an expansion of deployment should be undertaken to test the hypothesis that increased 1+ juvenile WCT in tributaries increases survival of WCT in the reservoir. This should be verified in yearly gill net sampling.

OBJECTIVE 5. Evaluate thermal otolith marking methods for marking WCT fry delivered from RSI's to enable more effective evaluation of RSI program.

It will be important to identify the origin of WCT fry and adults that are captured in gill net, population trend monitoring, in Libby Reservoir, and migrant trapping operations in the tributaries to the reservoir, to more precisely evaluate the effectiveness of RSI techniques for native trout recovery. No permanent marking technique has been developed for retention from fry to adult stage for WCT. Fry marking is inherently difficult through physical means (e.g. fin removal, pigment or tag injections). We must, therefore, mark fish at different life stages to assess survival and movements over time. One promising method of mass marking WCT fry is to mark the otoliths of pre-emergent fry by treating the eggs with variations in water temperature for regulated periods of time. This should provide a detectable mark on otoliths which can be detected when these fish are captured as adults (Schroder et al. 1996). Techniques shown to be effective will be invaluable for restoration efforts for WCT throughout the west.

OUTCOMES OF OBJECTIVE 5:
A catalogue of cold marking otolith patterns will be maintained at the MFWP-Libby office for future evaluation of RSI-based tributary recovery efforts. Results of the evaluation of cold marking techniques for use with WCT will be reported in quarterly and annual reports to BPA and pier review journal if applicable. All reports will be available on the MFWP-Libby web site.

OBJECTIVE 6. Develop a source of "in-drainage" westslope cutthroat trout eggs for use in RSI and artificial redd, WCT recovery program.

MFWP has used Hungry-Horse derived WCT brood stock as the source of eggs for all tributary and reservoir planting since the mid-eighties. MFWP has collected little evidence to indicate that planting of this strain of WCT has been effective in slowing the decline of WCT in Lake Koocanusa and its tributaries. While strain characteristics may not be a primary cause of the ineffectiveness of this program, using "in-drainage" gametes for recovery efforts should provide a greater chance of success. Large WCT are found in the tributaries to the Kootenai River in BC, in particular, the Wigwam River.

OUTCOME OF OBJECTIVE 6:
A source of in-drainage WCT eggs will be identified or developed for use in WCT recovery effort of in Kootenai system.

OBJECTIVE 7. **As part of the focus watershed program, develop an integrated watershed management plan for Young and Dodge Creeks which will incorporate cooperative agreements between MFWP fisheries and wildlife divisions, USFS and Montana Department of Natural Resources and Conservation (DNRC) and private landowners adjacent to the creeks.**

OUTCOMES OF OBJECTIVE 7:
A memorandum of understanding with be signed between MFWP and the USFS regarding a cooperative landscape scale riparian inventory of Young and Dodge Creeks. Data collected will be evaluated and reported in regular quarterly and annual reports. All stream manipulation and revegetation projects will include pre- and post-monitoring which, at a minimum, will include 1) Rosgen (1996) level III stream geomorphic evaluation and 2) fish population estimates. These will be reported in regular BPA reports.

OBJECTIVE 8. **As part of the focus watershed program, develop watershed-based, site-specific stream habitat protection and enhancement project identification and implementation on Libby Reservoir tributaries.**

A very successful program of landowner contacts and specific fish habitat protection and enhancement projects, on private lands, has been implemented over the first two years of the Excessive Drawdown Project. Over 15 important habitat projects have either been implemented or agreements have been reached to complete project work on tributaries necessary for recovery of native species. Over the past two years, the program has gained a good reputation in communities where we have been active. Successful negotiation of additional projects is therefore accelerating. Continued efforts to negotiate

and implement specific habitat projects on private land has the highest potential as a cost-effective, non-operational way to promote native species recovery for the reservoir.

OUTCOME OF OBJECTIVE 8:
Stream inventory data and population inventories will be summarized and reported in regular BPA reports. Prioritzation of identified project and the justification for this ranking will be reported. All stream manipulation and revegetation projects will include pre- and post-monitoring which, at a minimum, will include 1) Rosgen (1996) level III stream geomorphic evaluation and 2) fish population estimates. These will be reported in regular BPA reports.

OBJECTIVE 9. In cooperation with the Lincoln County Conservation District, Montana Department of Transportation (MDOT)and NRCS, develop a native material stream bank stabilization stockpile (rootwads, boulders, revegetation material) for use by private landowners, MDOT and MFWP in streambank conservation projects, in the Tobacco River drainage, where standard rip-rap and/or stream channelization are not desired.

Inexpensive fishery-enhancing bank stabilization material usually comes available during periods of the year when project work cannot be accomplished. Costs of stabilization material are often high or material is unavailable during period when stream work can be done. A stockpiling program will drastically reduce costs of materials if materials can be gathered and stored as they become available.

OUTCOME OF OBJECTIVE 9:
An accounting of bank stabilization material costs and inventories will be maintained at the MFWP-Libby office and an annual summary of site locations where materials were used and for what purpose will be included in annual reports to BPA.

OBJECTIVE 10. Develop a brood stock of native interior redband trout to be used as the initial source of eggs to an established hatchery facility.

Because of the threat of transferring whirling disease into hatcheries, there is a strong reluctance to accept wild fish into existing state facilities in order to grow them to a size where they can provide the quantity and quality of gametes necessary to meet the needs of a brood stock development program. A brood stock will be necessary to provide eggs for reintroduction efforts. Fish eggs are not vectors for whirling disease and can easily be brought into existing high production facilities. A temporary facility is needed to allow a captive population of interior redband trout to grow to sufficient size to allow for the efficient taking of sex products for brood stock development. This captive population facility should simulate a natural stream as much as possible to reduce non-natural

selection pressures that might potentially cause selection of behavioral characteristic that will make progeny less able to survive in re-introduction streams.

OUTCOME FOR OBJECTIVE 10:
Population data will be gathered and status for the fore mentioned redband trout populations will be evaluated and reported in regular BPA reports. This information will be presented to appropriate state and federal agencies to determine if initial brood stock development of interior redband trout is warranted. An implementatable design for a stable, secured rearing channel will be developed and permitted and included in regular reports to BPA. The channel will be constructed and monitored given favorable outcome of the population evaluation. A strategic plan will be developed in consultation with appropriate genetic and hatchery experts regarding numbers and location of fish that are targeted for collection and be reported as an individual document for review. Barring insurmountable issues raised in the review process, trout will be captured and moved to the constructed rearing facility.

OBJECTIVE 11. Assess the seasonal movement and habitat use of native burbot and westslope cutthroat trout and introduced "kamloops" trout in the Kootenai River above Libby Dam.

Recent studies have revealed previously undocumented long-range migrations of native burbot from Libby Reservoir into the Kootenai River and its tributaries in British Columbia. Little is still known about the significance of such migrations and how reservoir operations and habitat in British Columbia interact to influence transboundry populations. Ten ultrasonic transmitters and five radio transmitters have been implanted in adult burbot since 1995, the majority of which are still providing signals. Little is also known about what role British Columbia tributaries to the Kootenai River play in the population structure of westslope cutthroat trout. WCT have experienced a drastic population decline in the reservoir over the last decade. It will be important to understand the interchange between the reservoir and BC tributaries and how migrations between Montana and British Columbia might contribute to recovery of WCT in the U.S..

OUTCOMES OF OBJECTIVE 11:
Results will be reported in regular reports to BPA and pier reviewed journals where appropriate.

OBJECTIVE 12. Establish permanent protection of stream corridors where habitat protection and enhancement investments have been made by acquiring easements and purchase of riparian zones in target recovery areas.

The largest threat to many of the most important spawning and rearing tributaries to the Kootenai River, above Libby Dam, is subdivision and conversion of land from

agricultural uses to residential uses. Impacts of these changes in use can be reduced if protected stream corridors can be established on important streams. Acquiring easements and/or fee title would protect fish habitat in these streams from certain management activities such as elimination of woody vegetation, streambank stabilization with materials that reduce habitat for fish, and development of lawns. Much of the subdivision of these critical areas is expected to occur over the next five years.

OUTCOME OF OBJECTIVE 12:
Negotiations for acquisition of steam/riparian corridors will begin once a commitment to such a program is made. All acquisitions and land management agreements will be reported as separate documents and include the specific conservation objectives, value of property, expected benefits to the target resources, and estimates of either target resources being protected and/or evaluation of projected resources expected in "healthy-state" conditions. If degraded corridors are proposed for acquisition, a cost-estimate of bringing the parcel to "healthy-state"will be developed and reported. These reports will be forwarded to the BPA as part of regular reporting and be presented to the state Fish and Game Commission for their approval.

c. Rationale and significance to Regional Programs.

This project addresses mitigation for excessive reservoir drawdowns for power operations at Libby Dam, in excess of drawdown limits stated in the FWP (measures 903a and 903b, NPPC 1987). The Integrated Rule Curve (measures 10.3B.6 and 10.3B.7, NPPC 1995) have not been implemented, so the original drawdown limits are in effect. Impacts from several excessive drawdowns have yet to be mitigated. Native species aspects of this project are consistent with measure 10.1B which accords the highest priority to weak but recoverable, native populations injured by the hydropower system. Measure 10.2B requires comprehensive management which is carried out by the related Kootenai Focus Watershed project(9648701). Funding for on-the-ground watershed projects is included in this proposal and the related Libby Mitigation Program (8346700). Mitigation projects are directed by measure 10.3B, (specifically measure 10.3B.8) which instructs BPA to fund the design, construction and maintenance of mitigation projects. Research aspects are directed by measure 10.3B.5 which instructs BPA to continue to fund studies to evaluate the effects of Libby Dam.

d. Project history

This project began as a result of language in the 1987 Fish and Wildlife Program (measures 903(a) and (b), and 903(b)(1)(D)) which stated that if drawdown limits were exceeded for power purposes (85 feet at Hungry Horse and 90-110 feet at Libby), BPA shall fund the mitigation of fisheries losses caused by reservoir drawdowns in excess of the limits. In 1995, the Fish and Wildlife Program was amended to adopt and implement Integrated Rule Curves (IRCs) at Hungry Horse and Libby Dams. The earlier drawdown limits remain in effect until the IRCs are implemented.

MFWP and CSKT proposed a mitigation program to mitigate damages to the fisheries resources in Hungry Horse and Libby Reservoirs sustained during the period 1987 through 1991 (MFWP and CSKT 1993). BPA agreed to fund a three year project that began in November 1994. Funding was provided by BPA Power Supply rather than Fish and Wildlife Program dollars. Thus, this project has been funded under a separate process than other projects funded under the Fish and Wildlife Program.

The established drawdown limits were again exceeded for power purposes after the original excessive drawdown mitigation proposal was submitted to BPA. Record breaking drawdowns occurred in two years at Hungry Horse (1993, a 188 ft drawdown; 1994, a 173.8 ft drawdown) and a deep draft (1993, a 136 ft drawdown) occurred at Libby Reservoir in 1993. MFWP and CSKT documented fisheries losses incurred by these extreme reservoir drawdowns and requested that BPA fund mitigative actions (MFWP and CSKT 1997). The initial year of the project (FY98) was funded by Power Supply. Funding of future years will be reviewed and prioritized under the Fish and Wildlife Program (Bob Lohn, BPA personnal communication and contract stipulation) .

EDDM have identified and negotiated stream protection and rehabilitation projects at sites on Grave, Young, Spring, Sinclair, Therriault, Swamp, Lake, and Stahl Creeks of the Kootenai Drainage. EDDM have worked cooperatively with private landowners, USFS, NRCS, the Lincoln County Conservation District, Montana DNRC (State Lands) and the Montana Department of Transportation and the British Columbia Ministry of Environment to identify and design potential mitigation actions and habitat protection projects that will enhance fisheries in the Kootenai drainage.

EDDM was the Montana coordinator for the first transboundry redd counts with BC Environment in the Wigwam drainage of the Kootenai and performed helicopter redd counts with BC Environment biologist Bill Westover. The joint project, which included a downstream migration trapping operation by BC Environment, indicated that the Kootenai drainage (Wigwam River) may have one of the most important runs of bull trout in the world. EDDM initiated and designed a radio telemetry study of the transboundry bull trout population. EDDM worked cooperatively with BC Environment to capture 10 mature bull trout at their migration trapping facilities on the Wigwam River. EDDM implanted the fish with 50 month radio transmitters and am able to follow their movements with a fixed wing aircraft. The results of the telemetry work should provide us with valuable information about migration patterns, straying rates, and locations of other important spawning tributaries in the system.

EDDM designed and was responsible for all aspects of implementing a study to determine where, when and under what conditions Libby Reservoir burbot were spawning and how deep drafting of the reservoir will effect burbot populations. Little is known about burbot life histories. While this fish provides an historic local fishery, native burbot populations have not been sufficiently studied to determine population trends in

the Libby Reservoir-Kootenai River system nor has it been determined how the fish will respond to habitat alteration.

EDDM captured burbot using hoop nets, gill nets, and hook and line techniques and surgically implanted spawning-size burbot with both sonic and radio transmitters. EDDM have tracked transmittered burbot both with fixed-wing aircraft and by boat. Aircraft telemetry has revealed previously undescribed migrations of burbot greater than 60 air miles into tributaries of the Kootenai River above Libby Reservoir in British Columbia, a pattern that will likely have important management implications. EDDM tracked sonic tagged fish and noted season movements, and macrohabitat parameters from location sights (depth, substrate characteristics, bottom temperature and water column temperature profiles). EDDM conducted creel surveys to determine winter food habits, sexual maturation characteristics, age structure, and population trends. EDDM trawled the reservoir for pelagic burbot fry.
EDDM initiated a pilot westslope cutthroat (WCT) recovery program in tributaries of Lake Koocanusa. This recovery effort included tests of new techniques to imprint WCT to target streams using artificial redd construction and use of remote site incubators. This project is designed to test if fry, having hatched and remaining until emergence, in the target tributaries, would remain in the streams until they grew to a size where they would be less vulnerable to predation in the reservoir. EDDM showed that the current practice of releasing fingerling WCT into tributaries as a mechanism for target stream imprinting has failed to produce a significant return of spawning adults.

EDDM initiated a genetic sampling program in cooperation with Idaho Fish and Game and collected necessary tissue samples for a cooperative survey of mitochondrial DNA from Libby Reservoir, the Kootenai River in Idaho and the Kootenai River in British Columbia as well as Columbia Lake in British Columbia, to better understand metapopulation dynamics in the Kootenai River Drainage.

EDDM selected tributary stream to Libby Reservoir for determination of strength of adfluvial rainbow and westslope cutthroat trout spawning runs to compare to historic runs. EDDM installed and operated migrant traps, collected population age and growth statistics. Information gathered indicate a drastic decline in the number of adfluvial spawners.

EDDM was responsible for examining all reservoir tributaries for potential migration barriers that might be exposed when Libby Reservoir experiences deep drawdowns. EDDM was responsible for conducting public scoping meetings for a proposed chemical rehabilitation program of Kilbrennan Lake which included restocking with native inland redband trout to form a genetic reserve for the rare fish. EDDM conducted zooplankton assays, fish density surveys, and lake bathymetry surveys in preparation for the rehabilitation.

Publications

MFWP, CSKT and KTOI. 1997. Fisheries mitigation and implementation plan for losses attributable to the construction and operation of Libby Dam. **Draft Report**: Montana Department of Fish, Wildlife and Parks, Confederated Salish and Kootenai Tribes and the Kootenai Tribe of Idaho. Prepared for Bonneville Power Administration. Project No. 83-467.

Ostrowski, T., B. Marotz, C. Muhlfeld, S. Snelson, W. Young. In Prep. Summary Progress Report 1994-1998, Mitigation for Excess Drawdowns at Hungry Horse and Libby Reservoirs. Presented to the Bonneville Power Administration, Portland, Oregon Project 94-10

Snelson, S., C. Muhlfeld and B. Marotz. 1997. Draft Report. Excessive Drawdown Mitigation. Montana Fish, Wildlife & Parks. Filed with Bonneville Power Administration, Portland, OR.

e. Methods.

OBJECTIVE 1. Assess the metapopulation strength of transboundry (British Columbia and Montana) populations of native bull trout in the Kootenai River, above Libby Dam.

Task 1. In cooperation with BC Environment, conduct aerial (helicopter) redd surveys of the major tributaries of the Kootenai River (Lussier, Skookumchuk, St. Mary, Findlay, Kikomun, Bull, Wild Horse and White Rivers, Gold and Bloom Creeks) of British Columbia.

Task 2. Ground truth major redd concentrations found by aerial surveys and radio telemetry locations and identify possible index streams for long term population monitoring.

Task 3. In cooperation with MFWP management personnel and Libby Mitigation, conduct redd surveys in the Grave and Weasel Creek drainages of Montana.

Task 4. Capture, using merwin traps, electrofishing, hook and line, or hoop traps, and implant 20 adult bull trout in Libby Reservoir and 10 in the Kootenai river upstream of the Elk river, with 50-month radio transmitters (Winter 1983, Williams and Roaf 1973, Hart and Summerfelt 1975, Schramm 1984.)

Task 5. Track movements of radio-tagged trout through the staging and spawning seasons to identify previously unidentified spawning areas (Heezen and Tester 1967, Henderson et al 1966, Stasko 1971a, Stasko 1971b, Stasko 1971c, Summerfelt and Hart 1972.)

OBJECTIVE 2. Establish permanent stream form and sediment monitoring stations in the Wigwam River (BC) and Grave Creek (MT) to allow early detection of habitat degradation that could contribute to population declines for bull trout and westslope cutthroat trout in these two known spawning tributaries.

Task 1. Identify known spawning areas using redd counts in the Wigwam River and Grave Creek drainages and other identified drainages.

Task 2. Conduct McNeil core (Weaver and Fraley 1991, McNeil and Ahnell 1964) sampling in both drainages using stratified random sampling techniques within these known spawning areas and establish permanent coring stations for long term monitoring.

Task 3. Conduct juvenile population estimates at selected locations within the drainages.

Task 4. Identify known rearing areas in both drainages from population estimates and conduct Crouse (1981) substrate scoring transects (Weaver and Fraley 1991) in these areas.

Task 5. Correlate juvenile rearing densities with substrate scores and establish permanent substrate scoring stations in both drainages and juvenile population estimates (Weaver and Fraley 1991.)

Task 6. In cooperation with the Murphy Lake Ranger District, conduct stream habitat surveys for the entire Grave Creek drainage to identify the total amount and quality of spawning and rearing habitat available in the drainage (Rosgen 1996, Weaver 1991.)

OBJECTIVE 3. Fill in the gaps in our knowledge of native westslope cutthroat populations and other trout species in Libby Reservoir and associated tributaries.

Task 1. Determine strength of adfluvial spawning runs in Young, Big, Five-mile, Ten-Mile, Pinkham, Sinclair**,** Therriault, Swamp, Lake and Fortine Creeks and the Tobacco River, using migrant traps and redd counts.

OBJECTIVE 4. Determine the effectiveness of using remote site incubators (RSI's) and artificial redd construction as a means of increasing recruitment of age-1 or greater westslope cutthroat trout into Libby Reservoir.

Task 1. Operate the Young Creek permanent weir to capture upstream migrating adult trout and downstream migrating juvenile trout to monitor number of spawning adults entering the creek to spawn and measure the number and size of WCT emigrating from the creek into the reservoir.

Task 2. Conduct electrofishing population estimates in historically sampled reaches to monitor the effects of RSI's and artificial redds. Begin comparative monitoring for future reference.

Task 3. Continue deployment of RSI's (approximately 90,000 eyed-eggs/ yr) in Young Creek in each of the next four years. Expand RSI tests to other reservoir tributaries if stream population estimates in Young Creek indicate that this method significantly increases the number of 1 and 2 year-old WCT in tributary streams.

OBJECTIVE 5. Evaluate thermal otolith marking methods for marking WCT fry delivered from RSI's to enable more effective evaluation of RSI program.

Task 1. Treat all batches of eggs being deployed in RSI's with a unique series of temperature variations.

Task 2. Collect 15-20 eyed-eggs from every lot of eggs being deployed in RSI's, label and preserve in ethanol.

Task 3. Collect 15-50 emerged fry from each RSI, label and preserve in ethanol.

Task 4. Mount a random sample of eye-eggs from each lot, prepare a cross section of otolith from each fish in a lot (Neilson and Geen 1985, 1981, Campana and Neilson 1985.) and create a digital images catalogue of otolith growth patterns.

Task 5. Mount a random sample of emerged fry from each RSI collection, prepare otolith cross sections and create a digital images cross section catalogue of otolith growth patterns.

Task 6. Collect otoliths from out-migrating adult WCT captured in traps in Young Creek and from those WCT captured in Libby Reservoir gill nets. Prepare cross sections of otoliths.

Task 7. Determine if otolith patterns found in adult WCT have a similar early life pattern to that of a catalogued lots of eyed-eggs or emerged fry.

Task 8. Determine if RSI deployment using Hungry Horse derived WCT eggs has had a significant effect on the number of adults returning to spawn in specific tributaries and determine straying rates for RSI deployed fish.

OBJECTIVE 6. Develop a source of "in-drainage" westslope cutthroat trout eggs for use in RSI and artificial redd, WCT recovery program.

Task 1. Identify potential sources of "in-drainage" WCT eggs in British Columbia hatchery system.

Task 2. If a source "in-drainage" derived WCT eggs is available in BC, identify brood source characteristic, targeting fish that are "wild," have shown a tendency to thrive in large water bodies and have good potential to establish self-reproducing spawning runs.

Task 3. If a suitable "wild" strain is identified from BC, negotiate an egg exchange, obtain permits etc. to allow use of the eggs in the recovery program.

Task 4. If no source of eggs is available, cooperate with BC Environment to develop a plan to trap and hold sufficient numbers of Wigwam River WCT to provide genetic integrity and take sex products to transfer into existing Montana hatchery system for brood stock.

OBJECTIVE 7. **As part of the focus watershed program, develop an integrated watershed management plan for Young and Dodge Creeks which will incorporate cooperative agreements between MFWP fisheries and wildlife divisions, USFS and Montana Department of Natural Resources and Conservation (DNRC) and private landowners adjacent to the creeks.**

Task 1. Develop a memorandum of understanding between the USFS, Rexford district and MFWP for a two-year cooperative landscape analysis for the federal portion of the drainages.

Task 2. If favorable progress can be made in obtaining commitments from the USFS to reduce sediment loading in Young Creek, emanating from USFS lands, design and implement a channel reconstruction project for the channelized portion of Young Creek on DNRC lands.

Task 3. Remove and replace failing bridges and culverts on the private land sections of Young and Spring Creeks from the DNRC section to the confluence with Libby Reservoir.

Task 4. Complete revegetation program in areas of the creek where riparian fencing has been implemented.

OBJECTIVE 8. **As part of the focus watershed program, develop watershed-based, site-specific stream habitat protection and enhancement project identification and implementation on Libby Reservoir tributaries.**

Task 1. Contact landowners to describe goals and encourage cooperation in renovation efforts.

Task 2. Conduct stream inventories and evaluate feasibility of returning specific stream reaches to quality native trout habitat.

Task 3. Select and prioritize project sites for habitat restoration, livestock fencing and watering stations, migrant passage improvement, point source sediment abatement, streambank stabilization and revegetation of riparian areas

Task 4. Formalize landowner and agency agreements to protect investments. Develop cost-share programs with United States Forest Service, U.S. Natural Resources Conservation Service, Montana Department of Natural Resources and Conservation, Lincoln County Conservation District and other agencies**.**

Task 5. Develop site plans, maps, material lists and contracts, obtain 124, 3A and chemical treatment permits for selected project sites.

Task 6. Initiate purchasing, contracts and implement plans at highest priority sites. Document remaining projects for inclusion in the Libby Mitigation Program.

OBJECTIVE 9. **In cooperation with the Lincoln County Conservation District, Montana Department of Transportation (MDOT)and NRCS, develop a native material stream bank stabilization stockpile (rootwads, boulders, revegetation material) for use by private landowners, MDOT and MFWP in streambank conservation projects, in the Tobacco River drainage, where standard rip-rap and/or stream channelization are not desired.**

Task 1. Seek potential sources of useful dimensioned rootwads, logs and rocks and negotiate a reasonable price for such material.

Task 2. Contract with local equipment operators to collect, transport, and store at the State of Montana Department of Transportation storage yard in Eureka, rootwads, boulders and other native materials that can be used in stream restoration and bank stabilization projects.

Task 3. In cooperation with the NRCS and Lincoln Conservation District, provide technical advice and materials from the stockpile to landowners seeking to improve bank stability and fish habitat on streams where they hold interest.

OBJECTIVE 10. **Develop a brood stock of native interior redband trout to be used as the initial source of eggs to an established hatchery facility.**

Task 1. Survey for and design a creek channel for the spring water source at the Libby Field Station compound using Rosgen morphological standards that can be secured from escapement of trout.

Task 2. Obtain 124, 3A and 404 permits for channel construction and contract for channel excavation.

Task 3. Line the excavated creek bed and place rearing and spawning habitat structures in the channel.

Task 4. Monitor new creek for water quality and make adjustments as needed to provide maximum rearing habitat. Monitor for benthic invertebrate population establishment.

Task 5. Conduct population estimates for interior redband trout in the Basin Creek and the East Fork Yaak River drainages and determine how many individual fish might be taken from this population without impacting its viability.

Task 6. Given favorable indications from Task 5 and 6, electrofish interior redband from Basin Creek and transport to the Libby Field Station.

OBJECTIVE 11. **Assess the seasonal movement and habitat use of native burbot and westslope cutthroat trout and introduced “kamloops” trout in the Kootenai River above Libby Dam.**

Task 1. In cooperation with BC Environment, capture burbot and cutthroat trout using hoop nets, merwin traps, migratory traps, angling and electrofishing equipment, in Lake Koocanusa and its tributaries.

Task 2. Surgically implant radio and sonic transmitters into captured burbot and cutthroat trout.

Task 3. Monitor movements of radio-sonic tagged fish through several seasons to identify seasonal movements, habitat use and likely spawning concentrations (Johnson 1971.)

Task 4. Determine habitat preference by use of benthic samplers, temperature probes, turbidity samplers, and SCUBA transects (similar technique to bird flushing surveys, report pending) and snorkeling.

OBJECTIVE 12. Establish permanent protection of stream corridors where habitat protection and enhancement investments have been made by acquiring easements and purchase of riparian zones in target recovery areas.

Task 1. In cooperation with the Kootenai Drainage Focus Watershed Coordination Program, identify and develop potential easements and land purchase opportunities for riparian zones in Young Creek drainage, the Tobacco River and its tributaries.

Task 2. Collect and summarize the geomorphic and fisheries data required for the *Purchase Conservation Easement from Plum Creek Timber Company in Thompson and Fisher Rivers program* to determine the bandwidth necessary to protect fisheries resources in intact stream/riparian corridors in the Fisher River Drainage. Also, delineate the location and bandwidth necessary to cost-effectively recover impacted streams where their are substantial potential fisheries and riparian resources.

Task 3. Cooperatively develop, with the Kootenai Drainage Focus Watershed Coordination Program, budget requests to BPA for acquisition of easements and fee title for stream corridor protection areas.

f. Facilities and equipment.

The Libby Field Station of MFWP has two office buildings containing office space, wet lab and computer equipment sufficient for project staff. Remnants of the old fish hatchery provide facilities for meeting experimental aquiculture objectives. A workshop and boatshed are situated near the office buildings on the state property. State vehicles and workboats are available for project use. Electrofishing equipment (boat-mounted, bank and backpack units), surveying and GPS equipment, SCUBA gear, lake and river sampling devices for sampling/monitoring all trophic levels are available at the site. A bobcat with apparatus designed for habitat enhancement work is time-shared with the

Hungry Horse Mitigation Program. Minor tools and equipment are included in the project budget.

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Section 8. Relationships to other projects

the writeup for Dalbey's project.

This project complements the larger Libby Reservoir Mitigation Program addressing operational mitigation (Integrated Rule Curve refinement and assessment: measure 10.3B of the FWP) and non-operational mitigation (habitat and passage improvements).

Changes in dam operation for recovery actions in the lower Columbia have been shown to impact resident fish in the headwaters (ISAB 1997) and must be balanced to benefit all native fish species. Actions taken, must also be affordable or the public will likely stop the effort. To do this, decision makers must have tools to assess tradeoffs and make wise choices.

This project collaborates with the Libby Reservoir Mitigation Project by creating new trout habitat and by restoring degraded habitat to functional condition through stream rehabilitation and fish passage repairs. The two projects compliment each other in that they are concentrating on restoring and maintaining native trout populations in the Kootenai River System.

Compliments US Forest Service Forest Plan to enhance native species through habitat restoration projects and the NRCS and Conservation Districts in promiting stream bank stability.

The radio-telemetry work of this project will identify migration habits, habitat preferences and spacial distribution of species in the Kootenai System aiding state and provincial fish manageres in setting harvest regulations and in interceeding in land management decisions.

As stated above the project objectives are to identify, enhance and maintain native trout species in the Kootenai River system. These objectives compliment the concerns and efforts of the US Fish and Wildlife Service, and the Montana Bull Trout Recovery Team. These agencies are all advocating for the recovery of native species in the Kootenai, particularly white sturgeon, bull trout and westslope cutthroat.

Human resources and funding for most of the on-the-ground actions for Focus Watershed Coordination -Kootenai drainage (FWC-KR, Project # 9608720) are provided by the Excessive Drawdown Mitigation Program and Libby Mitigation Program. FWC-KR project provides coordination for both. FWC-KR is most closely connected with Libby Reservoir Excessive Drawdown Mitigation (EDDM, Project #9401000). The FWC-KR biologist serves as the primary supervisor for this program. This arrangements allows the EDDM to be successfully staffed with one senior fish technician and 1.5 junior technicians. The project biologist duties necessary for a successful, scientifically rigorous EDDM program, requires specialized data analysis and scientific and geomorphic design. These duties are cost-effectively provided by the FWC-KR biologist without the need for a separate EDDM project biologist. Conversely, EDDM technicians provide the essential biological, geomorphic and technical information needed for identifying limiting factors in watershed analysis and in monitoring implemented projects, as well as carrying out the day-to-day implementing of watershed based habitat projects.

Section 9. Key personnel

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BRIAN MAROTZ
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Education

Master of Science – Fisheries Management
Louisiana State University - Baton Rouge, Louisiana.
Estuarine Biology

15 Credits: Gulf Coast Research Institute

Ocean Springs, Mississippi.
Marine Science

Bachelor of Science – Biology (Aquatic Sciences)
University of Wisconsin - Stevens Point, Wisconsin.
Freshwater Biology

16 Credits: S.E.A. Semester at Sea, Boston University
Woods Hole, Massachusetts
Marine Biology

Professional experienceexperience

1991-Present Fisheries Program Officer, Montana Fish, Wildlife & Parks
Kalispell, Montana
Duties: Supervise Special Projects Office, Hydropower Mitigation and Focus Watershed Programs.

1989 – 1991 Fisheries Biologist, Montana Fish, Wildlife & Parks
Kalispell, Montana
Duties: Hungry Horse Reservoir Research, Develop Hungry Horse Mitigation Program, Computer Modeling Flathead and Kootenai Drainages, Develop Integrated Rule Curves (IRCs) for Montana Reservoirs.

1985 – 1989 Fisheries Biologist, Montana Fish, Wildlife & Parks
Libby, Montana
Duties: Libby Reservoir Research, Kootenai Instream Flow Project, Computer Modeling Flathead and Kootenai Drainages, Develop Integrated Rule Curves (IRCs) for Montana Reservoirs.

1984 – 1985 Research Associate, Louisiana State University - Baton Rouge, Louisiana
Duties: Estuarine Research to control salt water encroachment to Estuarine Marsh on the Sabine National Wildlife Refuge. Developed Operating Plan for Water Control Structures to Allow Migration of Catadromous Fish and Crustaceans

Publications

Pertinent Publications Listed in this Document

Scott Snelson
Focus Watershed Coordination Biologist (0.2 FTE)
Montana Fish, Wildlife & Parks
475 Fish Hatchery Road
Libby, MT 59923
Phone (406) 293-4713
Fax (406) 293-6338
E-mail ssnelson@libby.org

Education Master of Science - Biology

1992 - 1996 Montana State University Bozeman, Montana
3.8 GPA

Bachelor of Science - Fish and Wildlife Management
Montana State University Bozeman, Montana

Wildland Hydrology-Short Courses Pagosa Springs, Colorado
Applied Fluvial Geomorphology July 1996
River Morphology and Application August 1997

Performance Evaluation Training - Montana Dept. of Administration
Geographic Information Systems Training - MT Chapter Amer. Fish. Soc.
Clean Water Act Training - US Forest Service and MT Dept. of Env. Qual.
PADI certified Advanced SCUBA diver

Profession Experience

1997 - current Focus Watershed Coordination Biologist
Montana Fish, Wildlife & Parks Libby, Montana

Duties: Coordinate formation of local watershed working groups for development of "grass-roots" watershed plans and facilitate implementation of plans integrating state, federal, tribal, and private resources.

1995-1997 Project Leader - Libby Reservoir Excessive Drawdown Mitigation
Montana Fish, Wildlife & Parks Libby, Montana

Duties: Identify key limiting factors for native fish stocks in Libby Reservoir, develop and implement mitigation actions for the excessive drafting of Libby Reservoir and provide implementable mitigating measures for the construction of Libby Dam to be included in the Libby Dam mitigation plan.

1992-1994 Graduate Research Assistant
Montana State University Bozeman, Montana

Duties: Conducted research on the initial use of a newly accessible spawning stream by adult rainbow and brown trout and examined the use patterns of the stream by their progeny.

1993 Creel Survey Clerk
Montana Fish, Wildlife & Parks Townsend, Montana

Duties: Conducted creel surveys on anglers on Canyon Ferry Reservoir. Surveys included examination of catch for hatchery impregnated pigments, scale, and vertebrae collection for strain evaluation research.

1989-199 Conservation Director
Montana Wildlife Federation Bozeman, Montana

Duties: I administered the legislative lobby efforts of Montana's largest conservation organization which included bill drafting, legal research, coalition development, opinion poll design grass-roots network development, and coordinating and preparing hearing testimony. Other duties included grant development, education, fundraising, and local chapter establishment.

Awards Received

Wildlife Professional of the Year - Montana Wildlife Federation 1991.

Thomas E. Ostrowski
Senior Fisheries Technician (1 FTE)
Montana Department of Fish, Wildlife and Parks
475 Fish Hatchery Road
Libby, MT 59923

Degrees Earned

Michigan State University - East Lansing, MI
Bachelor of Science in Forest Resource Management, May 1985

CURRENT RESPONSIBILITIES

Project Leader- Montana Department of Fish Wildlife & Parks Libby Reservoir Excessive Drawdown Project:
6/97 - present

Plan and implement projects to restore and enhance habitat for native fish species in the Kootenai River Drainage.
Montana Department of Fish Wildlife & Parks Libby Fisheries Mitigation Project; 11/91 - 6/97

OTHER EMPLOYMENT

Fisheries Technician for U.S. Forest Service
@ Alsea District, Siuslaw National Forest; Philomath, OR; 5/91 - 9/91
@ Cordova District, Chugach National Forest; Anchorage, AK; 4/90 - 11/90
@ Elk City District, Nez Perce National Forest; Grangeville, ID 6/85 - 4/90

EXPERTISE

- Proficient back ground in the principles, methods of fish population and habitat surveys.
- Global Positioning Systems (GPS) and application computer programs used for mapping.
- Lead Projects SCUBA diver with advanced certification and experienced in adverse diving conditions.
- Experienced surveyor at the 3rd level of error.

1989: Region 1 Stream Inventory Methodology Workshop - Elk City, Idaho
1990: Copper River Delta Symposium - Cordova, Alaska
1996: Advanced SCUBA Certification - Kalispell, Montana
1997: Fish Mark and Recapture Symposium - Bozeman, Montana

PUBLICATIONS (RELEVANT)

Ostrowski, T., C. Muhlfeld, S. Snelson, W. Young. In Press. Progress Report, Mitigation for Excess Drawdowns at Hungry Horse and Libby Reservoirs. Presented to the Bonneville Power Administration, Portland, Oregon Project 94-10

Dalbey, S., J.DeShazer, L.Garrow, G.Hoffman, T.Ostrowski. In Press. Quantification of Libby Reservoir levels needed to maintain or enhance reservoir fisheries. Presented to the Bonneville Power Administration, Portland, Oregon

WILL YOUNG
Fisheries Technician (1FTE)
Montana Fish Wildlife and Parks
475 Fish Hatchery Road
Libby, Montana 59923

Education Bachelor of Science- FISH AND WILDLIFE MANAGEMENT
Montana State University- Bozeman 1995

Professional Experience

1996 - Present Fish and Wildlife Technician
Montana Fish, Wildlife and Parks Libby, MT

Duties: Responsible for assisting project manager(s) in identifying and instituting fisheries mitigation projects including the collection, and analysis of replicable data, supervision of volunteers, and personal contact with landowners.

1992 - 96 Fish and Wildlife Technician
Montana Fish, Wildlife and Parks Libby, MT

Duties: Assisted project biologist with data collection, including electro fishing, gillnetting, and water quality, data processing, and public relations.

Additional Training

1996 SCUBA Certified, Kalispell, MT.
1996 AFS Public Outreach Symposium, Bozeman, MT.
1996 Hydrolab Automated Water Quality Probes Instructional Course, Butte, MT

Expertise

- Operate and maintain electro fishing equipment, backpack and jet boat.
- Operate and maintain gillnetting equipment, vertical and horizontal.
- Operate and maintain jet and propeller driven boats in rivers and lakes.
- Operate and maintain SCUBA equipment in day, night, and ice conditons.
- Operate computer using various software. (Windows 95, Word Perfect 7.0, Microsoft Word 6.0, Excel, SPSS 7.5, dBASE programs, MS-DOS)
- Preserve, prepare, and analyze fish scales using heated acetate sheet method.
- Preserve, prepare, and analyze fish otoliths, and spines using grinder/polishers, and microscopes.
- Operate and maintain radio and ultrasonic telemetry equipment.
- Preform necessary surgery to implant radio and ultrasonic tags in bull trout, and burbot.
- Operate and maintain laser level surveying equipment.
- Operate and maintain GPS system.
- Build, install, and maintain fish trapping equipment.
- Identify Kootenai River basin fishes.

Section 10. Information/technology transfer

Project results will be published in reports to BPA and, where applicable, peer reviewed journals. Quarterly progress reports are sent to all interested agency and citizen groups. Results of the program are frequently presented at professional meetings within and outside MFWP, and in the public arena through invited presentations, newsletters, and news coverage. MFWP currently supports a state-wide rivers database with information on streams, fisheries, species distribution, etc. This database is administered from within our office and is accessible through MFWP's Internet web site.